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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/669,274	09/26/2000	Feliks Dujmenovic	ATI-000150BT	5685

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EXAMINER	
APPIAH, CHARLES NANA	
ART UNIT	**PAPER NUMBER**
2686	

DATE MAILED: 10/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/669,274	DUJMENOVIC, FELIKS	
	Examiner	Art Unit	
	Charles Appiah	2686	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02 August 2004 has been entered.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art **(Fig. 3)** in view of Havens et al. and further in view of Chi (5,239,274).

Regarding claims 1, 7 and 13 Applicant's admitted prior art Fig. 3 discloses an apparatus, a receiver for a wideband communication and a method for canceling an image signal from a received radio frequency signal, comprising: an oscillator (11), for producing a radio frequency signal having in-phase and quadrature components (input to mixers 14 and 12 respectively), a first mixer (14) having inputs configured to receive the in-phase component and the received radio frequency signal (inputs to mixer 14 with output I(t)), a second mixer having inputs to receive quadrature component and the

received radio frequency signal and outputting a quadrature phase signal (inputs to mixer 12 with output (Qt), a phase shift device coupled to one of the mixers (22) for receiving an output of the one mixer and outputting a phase shifted signal (output of phase shift device 22), and a combiner (20) coupled to the other of the mixers and the phase shift device without a level shift or inverter circuit (Fig. 3 shows no level shift or inverter circuit) for producing an image cancelled signal (output of combiner 20). Fig. 3 thus meets all limitations of claims 1, 7 and 13 except specifically disclosing that the local oscillator is a ring oscillator.

Havens discloses a carrier signal generator that generates in-phase and quadrature-phase carrier signal components using an N-stage ring oscillator for generating signals equal magnitude and arbitrary phase difference (see col. 1, lines 56-67). According to Havens implementing the oscillator as a ring oscillator produces balanced signals (including I and Q components), which differ in phase with the phase difference being a function of the number of stages of the ring oscillator (see col. 3, lines 38-64, col. 5, line 29 to col. 6, line 24).

It would therefore have been obvious to one of ordinary skill in the art to replace the oscillator and phase shift circuit of Fig. 3, with a ring oscillator in order to produce desired in-phase and quadrature-phase signals having a wide frequency bandwidth as taught by Havens with reduced circuit components.

The combination of Fig. 3 and Havens fail to teach wherein the ring oscillator including a plurality of delay cells, an output of each delay cell being coupled to an input

of another delay cell, one of the couplings between delay cells being cross-coupled so that the output of one delay cell is inverted prior to input into another delay cell.

Chi discloses a voltage controlled ring oscillator made up of a plurality of voltage controlled differential buffers in which the output of each buffer is coupled to an input of another buffer cell and one of the couplings between the buffers is cross-coupled so that the output of one buffer is inverted prior to input to another delay cell (see Figs. 4-6). Chi is pertinent since Chi teaches that the VCO having the differential buffers (delay cells) provides precise complementary phase signals which are not provided by a conventional ring oscillator and that the differential buffers also introduce less high frequency noise into the power supply network and offers improved power supply noise rejection (see col. 1, line 54 to col. 2, line 25). Chi further teaches that using differential buffers in a ring oscillator allows the use of an even number of differential buffers to be used which makes it possible to generate a multi-phase signal such as four buffers allowing the generation of a multi-phase signal having a number of phases that is four or a multiple of four (see col. 6, line 45 to col. 7, line 14).

It would therefore have been obvious to one of ordinary skill in the art to use the differential ring VCO of Chi in the combination of Fig. 3 and Havens in order to provide a high frequency response VCO that provides precise desired phase signals and introduces less high frequency noise, improved signal-to-noise ratios, better noise rejection properties for any desired communication application.

Regarding claim 2, the admitted prior art Fig. 3, further shows the phase shift device is coupled to the second mixer (42 being coupled to mixer 24).

Regarding claims 3, 8 and 15, Fig. 3, further discloses wherein the phase shift device shifts a phase of the second mixer output by 90 degrees (see col. 2, lines 57-59).

Regarding claims 4 and 9, the combination of Fig. 3, Havens and Chi show (as taught by Chi), the ring oscillator being made up of four delay cells (differential buffers). See Figs. 4-6.

Regarding claims 5 and 10, the combination of Fig. 3, Havens and Chi further teaches as taught by Chi that the propagation of signals through each buffer is proportional to the parasitic capacitance and inversely proportional to the source power supply current and that the delay can be adjusted by adjusting the current in response to bias voltage (see col. 5, line 35 to col. 6, line 18).

The combination of Fig. 3, Havens and Chi do not explicitly teach that each delay cell delays its output by forty-five degrees. However, since Chi discloses adjusting the propagation delay by adjusting the current in response to bias voltage, those of ordinary skill in the art would have appreciated being able to provide any desired delay such as forty-five degrees in order to uniformly distribute the multi-phase signals over three sixty degrees subject to circuit constraints and system requirements.

Regarding claim 14, Fig. 3 shows that the one phase signal is the quadrature phase signal (output of mixer 12 as (Qt)).

4. Claims 6 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (Fig. 3) in view of Havens et al and Chi as applied to claims 1 and 7 above, and further in view of Atherly et al. (5,140,198).

Regarding claims 6 and 12, the admitted prior art as modified by Havens and Chi fails to explicitly teach that the first and second mixers are Gilbert cells

Atherly discloses an image canceling mixer circuit in which the in-phase mixer is a conventional integrated circuit double-balanced mixer (see col. 3, lines 1-4) which functions as Gilbert cell mixers.

It would therefore have been obvious to one of ordinary skill in the art to use conventional double-balanced mixer in the circuit of the admitted prior art as modified by Havens and Chi in order to provide the advantages of a double-balanced mixer such as the provision of a very consistent low input impedance with optimum gain, wide bandwidth, good stability and low noise.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Dow et al. (5,659,263) discloses a circuit for reducing phase errors.

Response to Arguments

6. Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Appiah whose telephone number is 703 305-4772. The examiner can normally be reached on M-F 7:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on 703 305-4379. The fax phone

number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CA

CHARLES APPIAH
PRIMARY EXAMINER